Developing Idea Management Systems: Guidelines for Success

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***Abstract*—Idea management is identified as one of the most important organizational capabilities that would lead to better innovation outcomes. An idea management system (IMS) is a planned and controlled methodological procedure through which ideas flow from initiation and generation to execution and launch. This paper presents comprehensive guidelines on developing successful idea management systems. The guidelines were developed using action research methodology to develop an idea management system for an Egyptian industrial conglomerate. Results asserted that, besides developing the core functions of the IMS, several enabling organizational factors must also be reconsidered in order for the IMS to yield successful results. Most important core guidelines tackle idea generation techniques, idea submission process, idea evaluation criteria, technology portfolio mapping and project portfolio composition. For the enabling factors, guidelines tackle management support, IMS personnel selection, reward system characteristics, organizational awareness campaigns, IMS testing group, and required effeorts and dedication.**

***Index Terms*—idea management, idea management system, innovation, Egypt**

I. Introduction

To sustain a competitive edge and be able to survive in the current business environment, companies have to rely on a process of innovation that allows them to discover, evaluate, develop, implement, and launch ideas for new processes, products, and services rapidly and efficiently. Companies should be able to access the creativity and imagination of all stakeholders and align them to the key business issues identified as the strategic areas of interest to the company. They should also be able to handle the gathered ideas in an efficient way, properly evaluate them to identify those of greatest potential for success, and finally, successfully implement and launch them.

The process of idea solicitation and gathering, if conducted properly, could generate hundreds if not thousands of ideas for the enterprise. This huge sum of ideas can be found to overwhelm those responsible for gathering the ideas. It may also be found that poor measures for evaluating and selecting these ideas may be followed, causing the selection of the wrong ideas, the loss of valuable resources, and the failure of the innovation effort. Therefore, Idea Management, or the ability to mobilize the knowledge of the organization's employees into new knowledge that would lead to the creation of new products, services, or processes, is identified as one of the essential organizational capabilities required to execute successful innovation efforts.

Idea Management Systems (IMS) came into existence to allow for a structured method to handle ideas from the gathering stage up to the initiation and development stage. The IMS seeks to evolve the innovation process from the fuzzy, undisciplined, and haphazard image engraved in the minds of the early generations, to a systematic and disciplined approach that has clearly defined stages, criteria, and metrics. It is expected to control and manage the crucial activities of idea generation and solicitation, idea capturing, idea archiving, idea assessment and evaluation, idea selection, technology portfolio management, project portfolio management, idea implementation, and idea execution monitoring [1].

However, in order to develop a successful idea management system that would achieve better innovation outcomes, each organization has to take into consideration its unique strategy, capabilities, and resources. Moreover, it has to develop a dynamic and flexible system that should be able to reflect and respond to the changing organizational realities. This paper presents guidelines for the successful development and implementation of idea management systems in large multi cultured organizations. It uses action research to develop an idea management system for an Egyptian industrial conglomerate and extracts the most important reflections throughout the different iterations of the research. These are then conceptualized into general guidelines for successful development and implementation of idea management systems, especially in large organizations.

II. Litreature Review

An idea management system can be defined as a formal mechanism constructed to encourage employees to formally contribute new constructive ideas that would help in developing their organizations [2]. The idea

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management system is meant to be a planned and controlled methodological procedure through which ideas flow from initiation and generation to execution and launch. As explained by "reference [3]", Idea management systems evolved through four distinct generations. The first roots of an IMS can be traced back over a hundred years when the suggestion box was first introduced. The box was usually handled by the personnel department, and its primary goal was to introduce ideas for cost saving and waste reduction. But with most of the ideas dropped in the suggestion box going ignored, or with the lack of transparency regarding how these ideas were handled, employees eventually lost confidence and interest in these boxes. By the 1990s, the internet provided a medium for a new model for idea gathering. Companies started building web based pages where employees may post their ideas. But once again, these web based pages were still managed by the personnel department, and were most often built by the company IT department. Ideas were still treated in the same old fashion as the suggestion box, and eventually fell into the same problems that faced the suggestion box before it: frequent complaints, slow feedback and review, and a non-transparent backend system to how the ideas were handled.

The next generation of IMS system exhibited a boom in the computer automation of the systems. This new generation of IMS systems overcame many of the problems of the previous generation by providing added features such as automated review processes, contributor feedback though an automated response or an email, possibility to track progress of the ideas, etc.. But these systems also faced some of the problems of their previous generations; the systems were over flooded by trivial and low quality ideas that strained the resources provided to the system. Without any training provided to the employees and the idea contributors, a very small ratio of the submitted ideas was of any real value, which could easily slip from the system and its reviewers among the huge pile of submissions. It became finally evident that the problem with the IMS was not in the way they are being implemented but in the knowledge and the management systems that lay as the foundation for building the automated systems. Therefore, the new generation of systems was to realize a major change in its underlying concepts, incorporating the creativity enhancing tools and integrating them into the overall IMS systems. The goal was to move from the passive nature of the previous generations to an active system which seeks to increase the employee participation and level of creativity [3].

Idea Management Systems aim at developing tools and metrics to generate, assess, evaluate and track the selected ideas. When implemented in its entirety, the IMS is expected to control and manage the following innovation activities:

A. Idea Generations and Solicitation

Idea generation and solicitation seeks to introduce creative tools and processes through which the organization may better generate, develop and capture ideas from its stakeholders with greater efficiency and effectiveness. "Reference [4]" describes the ideation process as "the creative process of generating, developing, and communicating new ideas, where an idea is understood as a basic element of thought that can be visual, concrete, or abstract." Numerous methods and techniques have been created for the sake of capturing ideas and enhancing the process of creative idea generation and solicitation. These can be divided into idea submission techniques, idea solicitation techniques and idea campaigns. Idea submission and collection techniques such as suggestions boxes are passive techniques that only receive ideas and are usually characterized by idea overflow. Idea solicitation techniques seek to identify the potential sources of useful ideas from within and outside the organization, and reach out to these sources in order to capture the contributions that may be available. Finally, idea campaigns are used to solicit and generate ideas on demand [5]. In order to for these techniques to be successful, they need to be supported by creativity tools and an organizational culture that promotes innovation.

B. Idea Evaluation and Selection

Idea assessment and evaluation is a very critical stage of the idea management process. At this stage, firms must be able to differentiate valuable ideas and select between several potentially valuable projects [6]. As per "reference [7]", idea evaluation criteria usually include technical factors such as technical feasibility, and availability of required firm competences; marketing factors such as potential market size, probability of commercial success, and product life cycle [8]; regulatory factors such as adherence to safety and environmental regulations [9]; and finally risks associated with the particular stage of innovation wether discovery and invention, design and feasability, prototype and test, or launch and commercialization [10].

Numerous project selection methods have been created along the years to help guide organizations in making selection choices between potential projects [11]. The early generations of project selection techniques emphasized Discounted Cash Flow (DCF) method as a powerful tool for evaluating investments under risk. With the concept of DCF came very important related tools, like the net present value (NPV), the internal rate of return (IRR), and the weighted average cost of capital (WACC) [12]. Yet the excessive discount rates used in calculating the DCF, and the conservative forecast values predicted for the cash flow of the projects, worked as inhibitors of long term projects [13]. Other techniques that take into consideration the strategic and market impact of the project, such as ranking and scoring models and screening questions, were used to even out the purely financial focus of the DCF methods [14].

With the start of the 1990s, more sophisticated tools emerged that improved the ability of innovation managers to analyze the projects at hand. Projects were no longer regarded individually, but as units within larger groups or clusters of projects that combine to achieve organizational economic, technical, or strategic

goals. Mathematical and statistical tools that utilized the emerging power of personal computers and spread sheets become more common, and project portfolio management models emerged such as project portfolio management and simulation models [15].

Several authors, such as "reference [16]", explained that these different methods should not be considered as standalone techniques, but should be viewed as cornerstones or building blocks for arriving to the most optimal techniques for different organizations. The more modern methods tend to be mixtures or combinations of the mentioned techniques designed to serve specific purposes or industries. By elaborating on the described methods, and by covering other methods like the Hedging [17], Cognitive modeling [18], and the Analytic Network Process (ANP) methods [19], the innovation team should be able to map the different methods and adapt a model fitting with the nature of the organization and the innovation generation at which it stands.

C. Technology Portfolio Management

One of the main measures used when selecting the list of projects to be included in the project portfolio in the company's technology portfolio. This portfolio is one of the main tools needed to be able to strategically allocate the resources of the organization in projects that directly serve the technology strategy of the firm. "Reference [20]" suggested four steps for managing a technology portfolio of an organization. These are: establishing a database of all the technologies currently in use in the organization, mapping each technology in the database according to its lifecycle stage, analyzing and assessing the technologies in the portfolio, and finally revisiting and refreshing the technology portfolio periodically.

D. Project Portfolio Management

Organizations seeking to sustain their successful innovation efforts take into account the potential interactions between different projects, and how these interactions and the resource utilization may be optimized to achieve organizational economic, technical, or strategic goals. This could only be achieved through project portfolio management (PPM). According to "reference [21], PPM describes the methods used to analyze a large set of projects taking into account their interdependencies and mutual interactions, and to manage this set of projects based on a predefined group of key characteristics to meet specific business objectives. The last two decades have seen numerous PPM models introduced in literature such as optimization [22], sensetivity analysis [23], cluster analysis [24], and the aggregate project planning framework [25].

Each of the described IMS activities can be perceived as a separate stage for the development of ideas, some working in parallel and some working in series, through which the ideas flow in a preconceived system. Through these stages and gates, ideas are continuously being evaluated and assessed against pre defined criteria, and either allowed to go on or filtered out of the system.

The components of an idea management system are well identified. A fully fledged IMS is expected to include a front end interface that meets the users of the system to capture and register ideas, as well as to generate, develop, edit, and monitor the progress of ideas; a back end system where the underlying fundamentals and concepts of the system are implemented; metrics and measures based on which ideas are assessed and filtered; IT support to maintain the continuously evolving nature of IM systems, and finally a supportive organizational structure with clear roles and responsibilities of the different system stakeholders [26].

If applied correctly the IMS should lead the organization to select and implement only the ideas that optimize its project portfolio, providing the greatest rewards and satisfying the organizational economic, business, and technological strategies and aspirations. Therefore, organization should pay attention to the right development and implementation of Idea Management Systems to ensure its contribution to organization's sustainable competitive advantage. Despite this fact, not much research was conducted on how to develop successful idea management systems. Some scattered guidelines were presented by different authors to guide the development of IMS. These include defining the motivation behind the IMS, the objectives that the organization wants to achieve by creating the IMS, the needed systems and components, and finally the mechanism by which the IMS is expected to operate [26]. "Reference [27]" added that before designing the system an assessment of how ideas are currently managed should be conducted, the system must be user friendly and easy to use to allow ideas to be captured from all stakeholders, the review and assessment process must be well defined and transparent, the idea contributor should be involved in the process, and finally the system must take into consideration the unique culture of the firm. Nevertheless, no comprehensive guide for developing successful IMS was found in literature.

This paper provides thorough guidelines for developing and implementing idea management systems in large multi-cultured organizations. The research is conducted through action research on a large industrial organization in Egypt with more than 25 thousand employees and workers. The organization is specialized in the manufacturing of glass products with several business lines each having its own vision and strategy.

III. Research Methodology

The participatory action research method (PAR) was selected as the research methodology for the design and implementation of the IMS. The method is described as a research strategy that attempts to solve practical problems while building scientific knowledge and understanding simultaneously [28]. In this approach, changes are introduced to the current system based upon scientific theory and observation of the researcher. The combined output is studied and theoretical knowledge is produced. A major Egyptian industrial organization was selected for the study. The organization has requested to

remain anonymous, so it will therefore be referred to hereafter as Phoenix Industries. Phoenix is a world leader in its sector, and employs a workforce of over 25 thousand people.

The methodology defined for implementation of the PAR method in this research, based essentially upon the five phases of the PAR method mentioned earlier, may be described as follows:

A. Diagnosis

The research started by diagnosing the current status at Phoenix with regards to idea management and innovation, reflecting upon the existing conditions for idea capture and documentation, idea generation and solicitation, idea assessment and evaluation, the technology and project portfolios and the techniques used to create and document these portfolios, and the personnel entitled with performing all these processes.

B. Action Planning

The following tasks took place through each of the iterations of the planning phase:

- Define target idea management structure
- Recommend Idea generation and solicitation tools.
- Design methods for idea capture and documentation
- Prepare a model for idea assessment and evaluation
- Define how the Technology Portfolio will be developed and enhanced
- Define how the Project Portfolio will be developed and enhanced
- Create IMS flow chart and standard operating procedures (SOP)
- Assign the responsible personnel for each of the different tasks of the IMS
- Prepare the metrics upon which the success of the implemented model will be measured.

C. Implementation

The defined plan for each phase was then implemented during this phase.

D. Evaluation

All along the implementation process, the data was gathered and compiled for evaluation and assessment. The advantages and disadvantages of each action and tool were analyzed, and corrective procedures were planned where necessary. The metrics and measures defined for the evaluation of the IMS were accordingly assessed, most of which were subjective in nature and had clearly defined scales. These metrics can be grouped into different categories as indicated by Table I.

These measures were carefully evaluated by the researchers and the organizational experts at the end of each implementation phase, and an evaluation scale was defined for each. For the subjective measures, a clear and well described evaluation scale was created to assure standardized evaluation between different evaluators and along the different implementation phases.

TABLE I. EVALUATION METRIC AND MEASURES

Category	Metrics
Idea gathering and evaluation efficiency	1. Idea submission forms 2. Idea submitter feedback 3. Idea evaluation 4. Idea generation and creativity methods 5. Idea capture and documentation
Personnel	6. IMS personnel 7. IMS organizational awareness 8. Reward system
Strategy and technology management	9. Technology list 10. Technology mapping 11. Project portfolio
Overall IMS evaluation	12. Overall IMS maturity rating

E. Findings

Through each process of evaluation, specific findings were generated. These findings and discoveries were documented in the research.

F. Iteration

The iterative process of planning – implementation – evaluation was repeated. The iterative process could theoretically have been repeated indefinitely since it was not expected that on the short run the study would have reached a perfect system that solves all the problems within Phoenix. Accordingly the scope of the research was, from the start of the research, limited to a set maximum of two PAR iterations. The processes of fact finding and learning accompanied all stages of the iterative process.

G. Documentation

Upon completion of the different phases and iterations of the study, the following documentation was produced:

- The different findings and learning items of the study,
- The final proposed shape of the IMS and its components, and
- The future recommendations for further theoretical research.

IV. FINDINGS: GUIDELINES FOR BUILDING AN IMS

Based on two PAR implementation iterations performed at Phoenix, findings asserted that a successful idea management system can't be developed in isolation from the organizational context. Among other factors, the organizational strategy, communication patterns, management, employee skills level, performance evaluation and reward systems, current state of technology and even organizational size would affect the development and performance of the IMS. Therefore, the guidelines presented in the following section would be divided into main sections; system related guidelines that directly affect the main functions of the IMS, and organizational related guidelines that affect the

organizational context within which the IMS is operating, and hence, indirectly affect the IMS performance.

A. IMS Development Guidelines

Idea generation: the IMS team must work on introducing idea generation and creativity tools to the concerned employees and stakeholders. It is expected that the employees will initially meet these techniques with great enthusiasm since they will be mostly new and will provide evident outcomes. But the IMS team must ensure that the employees continue to take these techniques seriously, and that they always see the results of the tools on the short term. Otherwise the employees will begin to consider the techniques as games or a waste of time.

The different employee levels and specialties will find different preferences regarding the tools and techniques. The IMS team should then work on analyzing the results of the different techniques, and their adaptability to the different types of employees. Once these correlations between employee preferences and idea generation techniques has been created, the IMS team should then work on repeating the different techniques with the employees several times until the employees feel comfortable with these tools. Once the employees start using these tools by themselves without returning back to the IMS team, then this is the sign that the tools have been embedded in the culture and that the effort of the IMS team has become fruitful.

The IMS team should be careful though not to introduce too many new techniques to the employees before guaranteeing that the first techniques have been well accepted and adopted by the employees. Otherwise confusion will prevail and the efforts will produce negative instead of positive results.

One of the idea generation tools that proved to be very successful is idea campaigns. The IMS team needs to try out idea campaigns in order to generate more focused ideas that serve identified problems and challenges. Several obstacles are expected to face the team once implementing these campaigns, especially at the start, yet the task must be attempted in order to learn from these campaigns and achieve better ideation results.

Idea submission: an idea submission form, whether physical or digital, should be created with several considerations in mind:

- The form must be simple enough to encourage the idea submitter to provide their ideas with the least complications and effort, yet complicated enough to capture all the necessary details from the submitter. This must be adapted to the culture of the organization and the sophistication of the idea submitters.
- The form should be capable of stimulating the submitter to extract particulars specific to the idea which the submitter may be negligent of or might be taking for granted.
- The form must make the process of reviewing and evaluating the idea easier for the reviewers. It should also contain features that make the process of scoring the idea simple and straightforward

Idea submitter feedback: usually idea submitters expect to see immediate response for their submitted ideas. They believe that once they submit a good idea, they would be met with immediate acceptance and maybe even immediate reward. Research also shows that the main cause of failure of most idea management systems is the slow or lack of response to the submitted ideas. Accordingly, the following should be done with the idea submitters:

- Immediate acknowledgement of the idea submission, in the shape of a case number or a submission receipt.
- The submitter should be provided with a clear timetable showing the steps through which the idea will pass through and the time each step is expected to take
- Continuous feedback from the IMS personnel to the idea submitters to show that the idea is being handled professionally and promptly, and to clarify any delays in the original submitted timetable if they occur.
- Device feedback campaigns, where the IMS team reaches out to the idea submitters in bulk with updates on the submissions, and recommendations for future submissions. This keeps the submitters connected to the IMS and enhances the IMS image and reputation.

Idea evaluation: not all ideas are equal. The IMS will be flooded with simple and worthless ideas. But among the junk lies the valuable jewels that the IMS needs to be able to identify and dedicate time and effort to correctly evaluate. The IMS needs to solve the dilemma of finding the optimum balance between being capable of rapidly filtering out the junk, while decreasing the chance of losing valuable ideas among the filtered junk.

This may be solved by creating several filtering layers for the ideas, and creating different evaluation methods for each layer. Roughly the evaluation layers may be defined under three categories:

- Registration filter: in this layer the ideas are registered and a case number is generated. Then the idea is compared to all ideas in the database. If the idea has been previously submitted, or a basis for rejecting the idea may be found in the database history, then the idea is filtered out and immediate response may be provided to the submitter.
- Evaluation filter: this is the most critical layer, and requires the greatest amount of research and optimization. In this layer the idea is evaluated by reviewers and experts that follow defined templates for evaluation. Such templates should allow for rapid and accurate evaluation of large numbers of ideas. This layer may be performed in numerous ways, and the organization must find the best way fitting with its culture and with its expert's time.
- Feasibility: the ideas that pass through the previous layer must then be evaluated for feasibility. This may include activities like how it fits with the company strategy and the technology strategy, the economic feasibility, and the capability of the firm

to implement the idea. This is a time and effort consuming layer and thus only the best ideas must be guaranteed to pass through to this layer. The outcome of this layer will create the idea pipeline and be a major factor in determining future project portfolios.

Technology portfolio: The input of all technical and commercial departments is needed for the creation of the technology list and the technology portfolio. The technology list must be created from the point of view of each individual department, and then compiled to provide a general view of the entire company. This should then be reflected upon the technology mapping and the resulting technology portfolio. Employees will initially find this task alien to them, and thus resist cooperation and participation, but the IMS team must assure the proper feedback from all disciplines in order to generate a representative technology portfolio.

Project portfolio: The project portfolio is one of the most important objectives behind the IMS. A definitive and optimized list of projects for execution, backed up by an extensive pipeline of ideas, is the main target of the IMS. The following must be taken into consideration:

- The project portfolio must include projects from all types: incremental, platform based, and radical, in addition to basic research projects. The mix of projects must confirm to the overall company strategy and the generated technology strategy. The IMS, especially while still premature in its implementation, will tend to generate incremental projects more than long term strategic projects. The IMS team must work on adjusting this bias tendency to create a balanced portfolio.
- The generated portfolio, especially in the early stages, must always be reviewed with, and tuned to, the top management strategies and preferences. Such tuning will guarantee creating a tool that satisfies the objectives of the organization, and that overcomes the biases of the employees of different disciplines.
- In addition to creating the project portfolio, the IMS should also generate a pipeline of reviewed and accepted ideas ready for implementation and waiting to be inducted into the portfolio once resources allow for it. Though this pipeline will start small, yet the IMS team must grow this pipeline until it is 4 to 5 times the size of the actual portfolio. This will guarantee the availability of high priority projects for implementation at all times, regardless of the change in resource availability or in the company strategy.

B. Organizational Related Guidelines

In order for the IMS to be successfully implemented, several organizational enabling factors must also be taken into consideration. These include:

IMS personnel: since the subject of idea management is fairly new in most of the countries, recruiting and hiring personnel with previous idea-management implementation experience may not be feasible. Accordingly, the IMS planners should work on hiring individuals they perceive have the capacity and will to acquire the required knowledge and skills and implement the designed system.

The required skills and tasks for implementing the IMS were found to be of two different natures: incremental and continuous improvement tasks, and strategic long term tasks.

The idea management and continuous improvement tasks were found to be of a rapid progressing and changing nature. These types of tasks require individuals that react rapidly and are willing to go into the micro details of the subjects. On the other hand, the strategic, technological, and portfolio management topics are tasks that require a macro view of the matters. These tasks usually require individuals of discipline, vision, and accuracy. Experience has shown that it is not easy to find individuals who are capable of handling both types of tasks simultaneously.

The researcher's recommendation is to dedicate different personnel for each of these tasks. Both teams should then be managed by a single individual who has the managerial skills and knowledge to integrate both types of tasks into a coherent IMS effort.

Top management support: the single most important factor for the success of an IMS implementation is the top management commitment and support. Without full-fledged support, such a system is not expected to succeed within any organization. All effort must be ensued to assure the total backing of the top management before proceeding to implement the IMS.

The top management though needs to find enough credibility and gain trust in the system before it can provide it with its full support. This provides a tricky situation for the IMS since its success depends on the management support, while the full support will not be provided unless the system proves its success. Such a situation must be handled wisely and patiently. Transparent and clear communication with the top management will keep them updated of the progress and outcomes, and will also keep them informed of the challenges and risks. This way the support for the IMS will grow slowly with the growth of the system.

Reward system: rewarding the employees for their efforts in providing and evaluating ideas is a major pillar in an IMS. But the IMS implementation team must be careful of the following:

- The rewarding system must encourage idea submission without generating a culture of individuality and selfishness.
- Large monetary rewards usually drive employees to be individual players without sharing ideas and effort with others. The rewards do not have to be large, actually in most cases it was found that large rewards may have a negative impact on the organizational creative and teamwork culture.
- The rewarding does not have to be only monetary. Recognition and prestige may generate a better response than money in some situations. They may also enhance teamwork and collaboration among creative thinkers.

- A proper budget has to be defined and confirmed by the top management from the start to avoid let downs on the long run. This budget may then be updated regularly with the maturity of the system.
- The reward system must be fair and transparent. And the IMS team must make sure that the implementation of the rewarding is according to the designed system, since it is susceptible to abuse by the operators.

Test group: in large organizations, it is recommended that the IMS implementation efforts would start with a certain test group before expanding into the rest of the organization. The test group should be formed from the creative and open minded employees of the organization. Employees from R&D and marketing have shown to be the best source for this test group. This group should understand that these are experimental trials and thus susceptible to errors.

The feedback from this group should then be used to enhance and modify the IMS until a proper organizational fit is reached. The system may then go public, and proper recognition should be given to the test team. Such a team also allows the IMS implementations to try out the designed system and gain more confidence and maturity before going public.

IMS organizational awareness: A strong awareness campaign is needed to market for the IMS across the organization and to spread knowledge of the system among the employees of the different departments. These campaigns should work on encouraging creative participation, and on strengthening confidence and trust in the system. This should also be done through transparency and prompt feedback for idea submissions.

One of the successful strategies for organizational awareness is performing "one note campaigns" where the IMS team would schedule 5 to 10 minutes with each department on a revolving base and introduce and discuss one aspect of the IMS during these minutes. These campaigns were proven successful especially with blue collar workers who find them short and to the point.

Dedication and effort: finally, it must be noted that the task of implementing an IMS is a formidable task that requires much effort, time, wisdom and patience. The IMS implementation team must put all dedication and effort to lay down the foundation for an IMS that fits the nature and the culture of the organization and its employees. The unceasing task thereafter will be to continuously improve the system for better fit and greater effectiveness and efficiency.

V. Conclusion

Idea Management is considered one of the important organizational capabilities that could drive sustainable competitive advantage through successful innovation. The idea management system is the mechanism that enables organizations to properly exploit such capability. The IMS manages the flow of ideas from their onset in the imagination of the creative idea generators to their selection and identification as projects of optimal value for the organization. The IMS even intends to go one step further by training and stimulating the organization members, even those that did not believe in their inherent creative capacities, into becoming active idea participators and inspirational innovators. It aims at integrating idea generation, idea evaluation and selection, technology portfolio management and project portfolio management into one coherent system that serves to implement the organizational innovation strategy.

This research aims at providing comprehensive guidelines on developing successful idea management systems. The guidelines were developed using action research methodology to develop an idea management system for an Egyptian industrial conglomerate. Results asserted that, besides developing the core functions of the IMS, several enabling organizational factors must also be reconsidered in order for the IMS to yield successful results. Most important core guidelines tackle idea generation techniques, idea submission process, idea evaluation criteria, technology portfolio mapping and project portfolio composition. For the enabling factors, guidelines tackle management support, IMS personnel selection, reward system characteristics, organizational awareness campaigns, and IMS testing group.

Finally, building an IMS is a critical task that needs much planning, effort, and dedication by all those involved. Even with all these efforts, the system is not guaranteed to yield the expected success, and will definitely not succeed unless full support and commitment is provided by the company management. The art and science of building an IMS are still not definitive, and thus the efforts must be tailored to each company according to their inherent culture and unique requirements.

References

[1] R. Tucker, (2006). How Do You Manage Innovation? [Online]. Available: http://www.innovationresource.com: http://www.innovationresource.com/pdfs/media/Ask%20the%20Expert_RobertBTucker-Innovate-Forum.pdf

[2] E. Milner, M. Kinnell, and B. Usherwood, "Employee suggestion schemes: A management tool for the 1990s," *Library Management*, vol. 16, no. 3, pp. 3-8, 1995.

[3] B. Shockley, *A Short History of Idea Management and What Makes It Work (or Not Work)*, Tinton Falls, NJ: Innovation Software Advisors (ISA), 2006.

[4] B. Jonson, "Design ideation: The conceptual sketch in the digital age," *Design Studies*, pp. 613–624, 2005.

[5] J. P. Baumgartner, (2008). *An Introduction to Idea Management*, Belgium: Jenni IMS Software Service.

[6] J. B. Tidd, *Managing Innovation*, 4th Ed. West Sussex, England: John Wiley & Sons, 2009.

[7] L. Merkhofer. (2010). *Technical Terms Used in Project Portfolio Management*. Retrieved Decemeber 13, 2010, from Priority Systems: http://www.prioritysystem.com/glossary2.html#ppm

[8] I. Komninos, *Product Lifecycle Management*, Thessaloniki, Greece: Urban and Regional Innovation Research Unit, Aristotle University of Thessaloniki, 2002.

[9] J. Martino, *R&D Project Selection.* New York: John Wiley & Sons, 1995.

[10] SOI. (2008). *Stages of Innovation.* Retrieved 12 4, 2010, from stagesofinnovation.com

[11] F. P. Boer, Financial Management of R&D. *Research-Technology Management*, 2002.

[12] R. Brealy and S. Myers, *Principles of Corporate Finance*, New York: McGraw Hill, 1996.

[13] F. P. Boer, "Traps, pitfalls and snares in the valuation of technology," *Research-Technology Management*, vol. 41, pp. 45-54, 1988.
[14] M. Schilling, *Strategic Management of Technological* Innovation, New York: McGraw Hill, 2008.
[15] G. R. Powers, "Simulation based project selection decision analysis tool," in *Proc. Simulation Conference*, 2002, pp. 1778-1785.
[16] F. Boer, "Risk-adjusted valuation of R&D projects," *Research-Technology Management*, 2003.
[17] L. M. Luo, H. J. Sheu, and Y. P. Hu, "Evaluating R&D projects with hedging behavior," *Research-Technology Management*, 2008.
[18] J. T. Funge, "Cognitive modeling: Knowledge, reasoning and planning for intelligent characters," in *Proc. 26th Annual Conference on Computer Graphics and Interactive Techniques*, 1999.
[19] L. P. Meade, "R&D project selection using the analytic network process," *IEEE Transactions on Engineering Management*, pp. 59-66, 2002.
[20] C. Curran. (2009, May 27). 4 Steps to Manage Your Technology Portfolio. [Online]. Available: http://www.ciodashboard.com/it-management/manage-technology-portfolio/
[21] R. G. Cooper, *Portfolio Management: Fundamental for New Product Success*, Ontario: Product Development Institute Inc., 2010.
[22] M. Gulesian. (2006, April 24). *Capital Budgeting: IT Project Portfolio Optimization Redux.* [Online]. Available: http://www.developer.com/mgmt/article.php/3601061
[23] M. R. Middleton, *Decision Analysis Using Microsoft Excel.*, San Francisco, CA: University of San Francisco, 2007.
[24] R. G. Mathieu, "A methodology for large-scale R&D planning based on cluster analysis," *IEEE Transactions on Engineering Management*, pp. 283-292, 1993.
[25] C. C. Wheelwright, *Creating Project Plans to Focus Product*, Development, Boston: Harvard Business Review, 1992.
[26] L. Mackinnon, *What is an Idea Management System? Idea Management Systems*, Mendonca, Rosa, July 21, 2007.
[27] R. Tucker, *Driving Growth Through Innovation*, San Francisco, CA: Berret-Koehler Publishers, Inc, 2002.
[28] K. Lewin, "Action research and minority problems," *Journal of Social Issues*, pp. 34-46, 1946.

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